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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|----------------------|------------------|
| 10/783,178 | 02/20/2004 | Jannick Rolland | UCF-371 | 7293 |
| 23717 | 7590 | 12/14/2004 | EXAMINER | |
| LAW OFFICES OF BRIAN S STEINBERGER 101 BREVARD AVENUE COCOA, FL 32922 | | | HARRINGTON, ALICIA M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2873 | |

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|---------------------|----------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/783,178 | ROLLAND ET AL. |
| | Examiner | Art Unit |
| | Alicia M Harrington | 2873 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 20 February 2004.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-20 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 20 February 2004 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>0204</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Information Disclosure Statement***

1. The Examiner has considered the information disclosure statement filed on 2/20/04.

Drawings

2. The drawings are objected to because the figures 1a and 1b are not clear enough for the Examiner to see details of the invention (the pictures are dark and grainy). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

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3. The disclosure is objected to because of the following informalities: At page 9, a line 22, the Examiner believes the disclosure should refer to projection lens element numbers 805 and 806 not element numbers 804 and 806.

Appropriate correction is required.

Claim Objections

4. Claim 5 objected to because of the following informalities: In line 2, the Examiner believes the word “component” was inadvertently left out of the phrase “ARC display component”. Appropriate correction is required.
5. Claim 6 is objected to because of the following informalities: In line 1, the Examiner believes the words “optical tiling” was inadvertently left out of the claim forward the word “display”. Appropriate correction is required.
6. Claim 14 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 12 recites the screen is located at ½ meter from the viewer. Claim 14 recites the display is located remotely. Thus claim 14 fails to further limit claim 12.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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8. Claims 6, 13,14,15-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites “ about a 120 degree binocular FOV” in line 2. Claim 6 depends from claim 1 that defines an overall binocular horizontal FOV. The examiner is unclear if applicant is referring to a horizontal or vertical binocular field of view. Thus, applicants failed to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim is indefinite.

Claim 13 recites “the method of claim 12” in line 1 but claim 12 is an apparatus claim. Thus applicant simultaneously claims both statutory classes (apparatus and method). Thus the claim is ambiguous and indefinite under 112 second paragraph.

Claim 14 recites “the method of claim 12” in line 1 but claim 12 is an apparatus claim. Thus applicant simultaneously claims both statutory classes (apparatus and method). Thus the claim is ambiguous and indefinite under 112 second paragraph.

Claim 15 recites in line 3, “with mm to a head of a viewer”. The letters “mm” are not defined in the claim nor do the letters have a value if they are reference to measurement term millimeters. Thus, applicant failed to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim is indefinite.

Claims 16-18, 20 recites “the method of claim 15” in line 1 but claim 15 is an apparatus claim. Thus applicant simultaneously claims both statutory classes (apparatus and method). Thus the claim is ambiguous and indefinite under 112 second paragraph.

Claim 19 recites “the method of claim 18” in line 1 but claim 18 depends from apparatus claim 15. Thus applicant simultaneously claims both statutory classes (apparatus and method). Thus the claim is ambiguous and indefinite under 112 second paragraph.

Claim 20 also recites in line 2 “within mm to the HMPD”. The letters “mm” are not defined in the claim nor do the letters have a value if they are reference to measurement term millimeters. Thus, applicant failed to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim is indefinite.

Claims 6,13-20 will be examined as best understood by the Examiner.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 7-9, 15,16,18 are rejected under 35 U.S.C. 102(b) as being anticipated by Larson (US 5,418,584).

Regarding claim 7,Larson discloses a method of providing a wide field of view (FOV)(col. 2, lines 50-60 and col. 4,lines 20-25) to a head mounted display (see for example the embodiment of figure 4) comprising the steps of:

a) combining an Artificial Reality Center (ARC) display component (11) and an optical tiling display (for example 21,22,23); and,

(b) integrating said component and said tiling display (in the same head mounted display system) whereby an overall binocular field of view (FOV) greater than about 80 degrees is realized (see col. 4, lines 49-55).

Regarding claim 8, Larson discloses the method of claim 7, whereby an overall binocular FOV greater than about 120 degrees is realized. Larson teaches more than 100 degrees. Thus, Larson range encompasses more than 120 degrees.

Regarding claim 9. Larson discloses the method of claim 7 wherein the optical tiling display is subjected to an aft-projection folding (see figure 4a).

Regarding claim 15, Larson discloses a wide field of view (FOV) head mounted projection display (HMPD) system comprising an artificial reality center (ARC) display (11) made of retro reflective material attached closely within mm to a head of a viewer (see figure 4).

Regarding claim 16. Larson discloses wherein said ARC display is made of retro reflective material to form a curved screen to cover the wide FOV (for example see figures 4b and 2).

Regarding claim 18, Larson discloses whereby a compact lens (19 or 23) is employed to image the projected image to the ARC display (see col. 4, lines 20-30).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-4,6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (US 5,572,229) in view of Larson (US 5,418,584).

Regarding claim 1, Fisher discloses a head mounted projection display (HMPD see figures 2 and 5) comprising: an Artificial Reality Center (ARC) display component (32; col. 6,lines 1-12 having a field of retro reflection in the projection field of an optical tiling display (for example: 37,33,36,103; col. 4, lines 63-67) which provides a greater than about 80 degrees Field of View (FOV) per eye (see col. 5, lines 1-35; figure 5- A, B), whereby an overall binocular horizontal field of view greater than about 80 degrees is realized (col. 5,lines 20-25 and col. 6, lines 14-60). However, Fisher fails to specifically disclose the HMPD system has an ARC display component having a greater than 70 degree field of retro reflection integrated with an optical tiling display.

In the same field of endeavor, Larson discloses a HMPD system where an ARC display component (for example see figures 4a and 4b; 11) integrated with an optical tiling display (see figure 4a-HUD system-see col. 4,lines 49-67). Larson also teaches that exact optical positioning of various components in the projection system design determines a large field of view (see col. 4, lines 30-45). Larson teaches the retro reflecting screen shape and reflective elements (see col. 6) such as corner cube elements in the screen determine the how the images are reflected. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make to modify Fisher, to integrate a screen into a HUD display system, as taught by Larson, since Larson teaches it is known in the prior art and such a configuration allows for a greater than 100 degree horizontal and 50 degree vertical field of view. Further, Fisher provides a screen (ARC display component) capable of retro reflection in HMPD system with wide field of view,

and it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a retro reflection screen (ARC display component) greater than about 70 degrees field of retro reflection, since Larson teaches system design parameters includes the shaping and angular orientation of the reflective screen (ARC display component) effects the field of view in a projection system. Additionally, Fisher and Larson discloses the claimed invention except for the claimed degree of retro reflection and since it appears the system would work equally as well with the retro reflections screens of Fisher and Larson, the claimed feature lacks criticality.

Regarding claim 2, Fisher discloses the HMPD of claim 1 wherein the tiling display provides a greater than approximately 70 degree horizontal FOV (see col. 5, lines 20-25).

Regarding claim 3, Fisher discloses the HMPD of claim 1, wherein the tiling display provides a greater than 50 degree vertical FOV (90 degrees; see col. 6, lines 40-45).

Regarding claim 4, Fisher discloses the HMPD of claim 1 whereby an overall binocular horizontal FOV is greater than about 120 degree is realized (see col. 5, lines 20-25).

Regarding claim 6, Fisher discloses the display (optical tiling) of claim 1 having a resolution of about 2 arc minutes for the about 120 degree horizontal binocular FOV (see col. 5, lines 20-35).

Fisher discloses the projection system provides a low resolution of 8 arcs per minute and a high resolution of 2 arcs per minute projection. However, Fisher and Larson fail to specifically disclose the display resolution as small as about 1 arc minute for a slightly reduced FOV. The resolution of projection display images depends on the resolution of display/imaging component in a HMD and optics for projecting an image from the display as illustrated by Fisher. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to

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modify Fisher and Larson, since the claimed resolution parameter would be a result of the system components/design; and they disclose the claimed invention except for the claimed resolution as small as about 1 arc minute for a slightly reduced FOV and since it appears the system would work equally as well with the resolution of the display of Fisher and Larson, the claimed feature lacks criticality.

13. Claims 10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larson (US 5,418,584).

Regarding claim 10, Larson the method of claim 7 wherein the combing steps also includes a compact lens (19 or 23) between the ARC display component (11) and said optical tiling display (21). Although the ARC display component and tiling display are close together (integrated in a HMD), Larson fails to specifically disclose the distance between the display component and optical tiling display is smaller than 150 mm. However, Larson discloses the claimed invention except for the distance between the display component and optical tiling display is smaller than 150 mm and since it appears the system would work equally as well with optical distances of the ARC (11) and tiling display (21) of Larson, the claimed feature lacks criticality.

Regarding claim 17, Larson discloses the method of claim 15 wherein said ARC display is attached closely- it's a HMD. Thus, it would have been obvious to one of ordinary skill in the art the display is attached within approximately 100 mm to the viewer, since it's a HMD and head mounts displays are obviously within millimeters of the viewer.

14. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (US 5,572,229) in view of Larson (5,418,584), further in view of Rallison et al (US 6,097,543).

Regarding claim 5, Fisher and Larson discloses the HMPD of claim 1 having a compact lens when the ARC display component is closely attached. However, Fisher and Larson fail to specifically disclose the lens is a Fresnel lens.

In the same field of endeavor, Rallison teaches using a diffractive lens, such as a Fresnel lens in a HMD system (see col. 7,lines 5-29). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Fisher and Larson, as taught by Rallison, to include a Fresnel lens in the optical system, since Rallison teaches it improves image contrast.

15. Claims 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larson (US 5,418,584) in view of Rallison (US 6,097,543)

Regarding claim 11, Larson the method of claim 7 wherein the combing step also includes a compact lens (23) when the distance between the ARC display component (11) and said optical tiling display (21). However, Larson fails to specifically disclose compact lens is a Fresnel lens.

In the same field of endeavor, Rallison teaches using a diffractive lens, such as a Fresnel lens in a HMD system (see col. 7,lines 5-29). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Larson, as taught by Rallison, to include a Fresnel lens in the optical system, since Rallison teaches it improves image contrast.

Regarding claim 19, Larson discloses the method of claim 18. However Larson fails to specifically disclose the compact lens is a Fresnel lens.

In the same field of endeavor, Rallison teaches using a diffractive lens, such as a Fresnel lens in a HMD system (see col. 7, lines 5-29). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Larson, as taught by Rallison, to include a Fresnel lens in the optical system, since Rallison teaches it improves image contrast.

16. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (US 5,572,229) in view of Hua et al (An Ultra-light and Compact Design and Implementation of Head-Mounted Projective Display)

Regarding claim 12, Fisher discloses a wide field of view (FOV) head mounted projection display (see col. 3, lines 50-60) HMPD system comprising an artificial reality center (ARC) display (32; see col. 4, lines 1-15) made of retro reflective material located apart from the viewer in the environment (see for example figures 1, 3 and 4). However, Fisher fails to specifically disclose the material is located at least approximately 1/2 meter.

In the same field of endeavor, Hua discloses HMPD system where a retro reflective material is located at least approximately ½ meter apart from the view in the environment (see section 4.2). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Fisher to include a retro reflection material ½ meter from the viewer, since it is known in the art and it provides a brighter more uniform image as taught by Hua et al.

Regarding claim 13, Fisher discloses the method of claim 12 wherein said ARC display is made of retro reflective material to form a curved screen to cover the wide FOV (see for example figure 1; col. 6, lines 50-60).

Regarding claim 14, Fisher discloses the method of claim 12 wherein said ARC display (retro reflector) is remotely located to allow the viewer to see both the environment and the virtual objects projected by the optics of the HMPD (see col. 7, lines 5-10 and figure 3). Fisher discloses the projection system is not limited to flight simulation but employed in a variety of simulation environments (immersive and non-immersive/see through). However, Fisher fails to specially disclose the projection of 3D objects. Hua also teaches HMD projection systems can be immersive or non-immersive but the HMD is improved by using projection optics and using a retro reflective screen with certain materials to provide an undistorted 2D or 3D viewing of virtual objects (see sections 2.2 and 2.3). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Fisher, as taught by Hua, to provide 3D virtual objects in a see through environment, since it is known in the prior art of HMD's using retro reflective type systems.

17. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Larson (US 5,418,584) in view of Hua et al (An Ultra-light and Compact Design and Implementation of Head-Mounted Projective Display)

Regarding claim 20. Larson discloses the method of claim 15 wherein said ARC display is attached closely within mm to the HMPD to allow the viewer to see virtual objects projected by the HMPD (for example see figure 4 and see col. 6, lines 40-55). Larson also discloses the HMD

can be an immersive head mounted display or see through. However, Larson fails to specially disclose the projection of 3D objects. Hua also teaches HMD projection systems can be immersive or non-immersive/see-through but the HMD is improved by using projection optical and using a retro reflective screen with certain materials to provide an undistorted 2D or 3D viewing of virtual objects (see sections 2.2 and 2.3). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Larson, as taught by Hua, to provide 3D virtual objects in an immersive environment, since it is known in the prior art of HMD's using retro reflective type systems.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alicia M Harrington whose telephone number is 571 272 2330. The examiner can normally be reached on Monday - Thursday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571 272 2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



AMH

Alicia M Harrington
Examiner
Art Unit 2873